Dr. Larry Percy

Explore cognitive associations with the subject and construct a ‘map’ of the cognitive structure likely to be involved.

Cognitive responses for:

- atmosphere
- climate
- coastlines
- floods
- hurricanes
- ice storms
- lightning
- oceans
- weather

Associations in memory were largely *descriptive*

- Concrete noun or adjective attributes
  (rain, snow, salty, Texas, white, Atlantic)

- Subjective characteristics
  (variable, massive, drama, powerful, development)

Associations in memory

- Overall, about 1/4 were negative
  (polluted, danger, depleted, scary)
- Only 10% were clearly positive
  (beautiful, awesome, stunning)
- Only one association reflected an emotion
  (sad)

Associations in memory

- A surprising lack of any priming effect
- Suggest no common neural network, which is surprising given their clear association at a macro level

Associations in memory

- Given the highly charged attention to environmental issues, it is surprising that
  - there is no emotional response
  - a relatively low level of negative associations

Associations in memory

- The descriptive nature of the cognitive responses, coupled with no emotional response suggests very little involvement with the issue

Associations in memory

- Other topics that ‘belonged’ with the list being discussed were solicited, and of the 30 additions offered, only three were mentioned in more than one group

Associations in memory

- This again suggests no common schema and strong evidence that there is not a neural network in place for what might be called ‘the environment’

Associations in memory

- This can make communication difficult when dealing with more than one of these topics that are broadly part of the Earth's environment

Cognitive structure

- An important consideration in the development of a communication program is an understanding of how people ‘see’ and understand the subject of the communication

Cognitive structure

- This will influence how messages are processed and interpreted, and reflects what is called a cognitive structure

Cognitive structure for ‘Environment’

- There seems to be no set meaning in memory
- It appears more conceptual, lacking any definite structure
- Six unrelated schema are activated by the word ‘environment’
- With essentially no secondary association

The schema identified were:

Need for action	protection, conservation, recycle
Problems	pollution, dirty, global warming
Danger	messed up, dying, danger, death
My world	world around us, surroundings, living space
Eco-system	climate, eco, eco-system
Positives	healthy, wonderful, good, beautiful

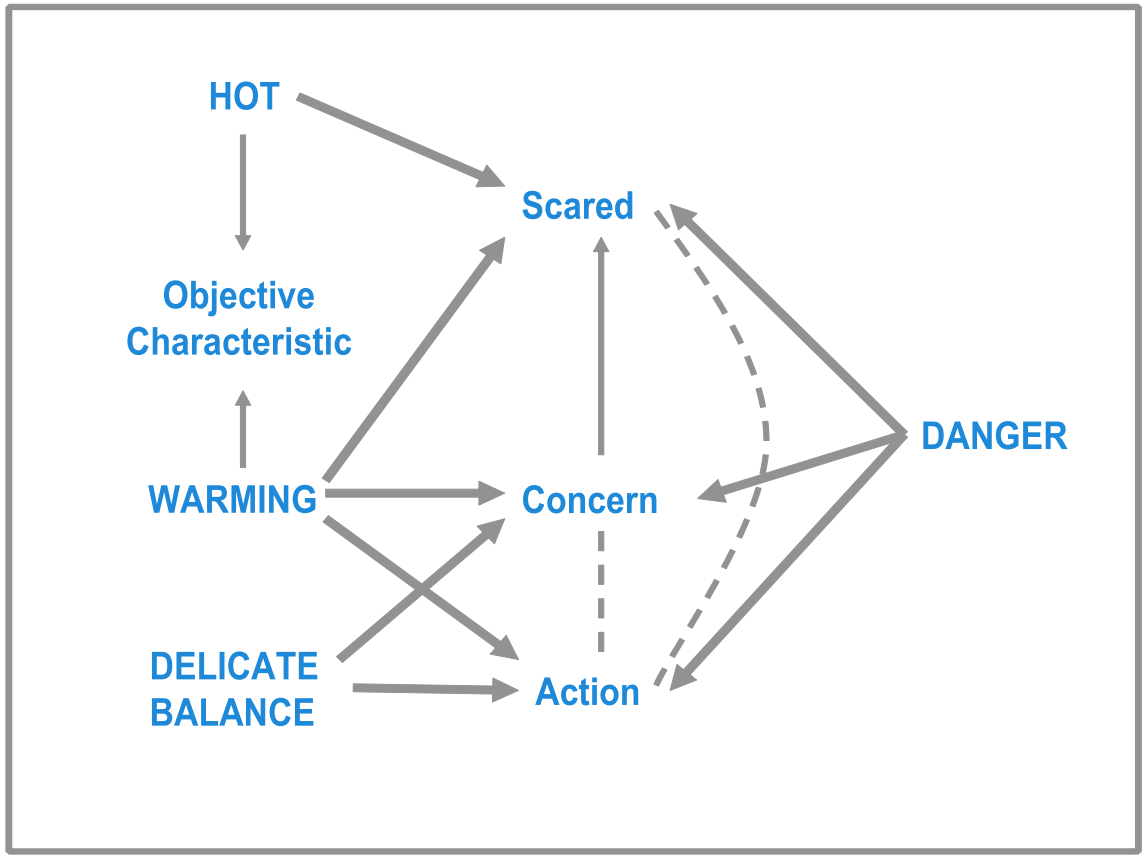
Cognitive structure for ‘Climate Change’

- Again, a diverse set of schema, but there is some linkage at the secondary level
- This suggests at least some underlying stability to the construct

Cognitive structure for ‘Climate Change’

- People appear to have one of two general structures:
  - some see ‘climate change’ as a problem
  - others as being more benign

Cognitive structure for ‘Climate Change’ as a problem



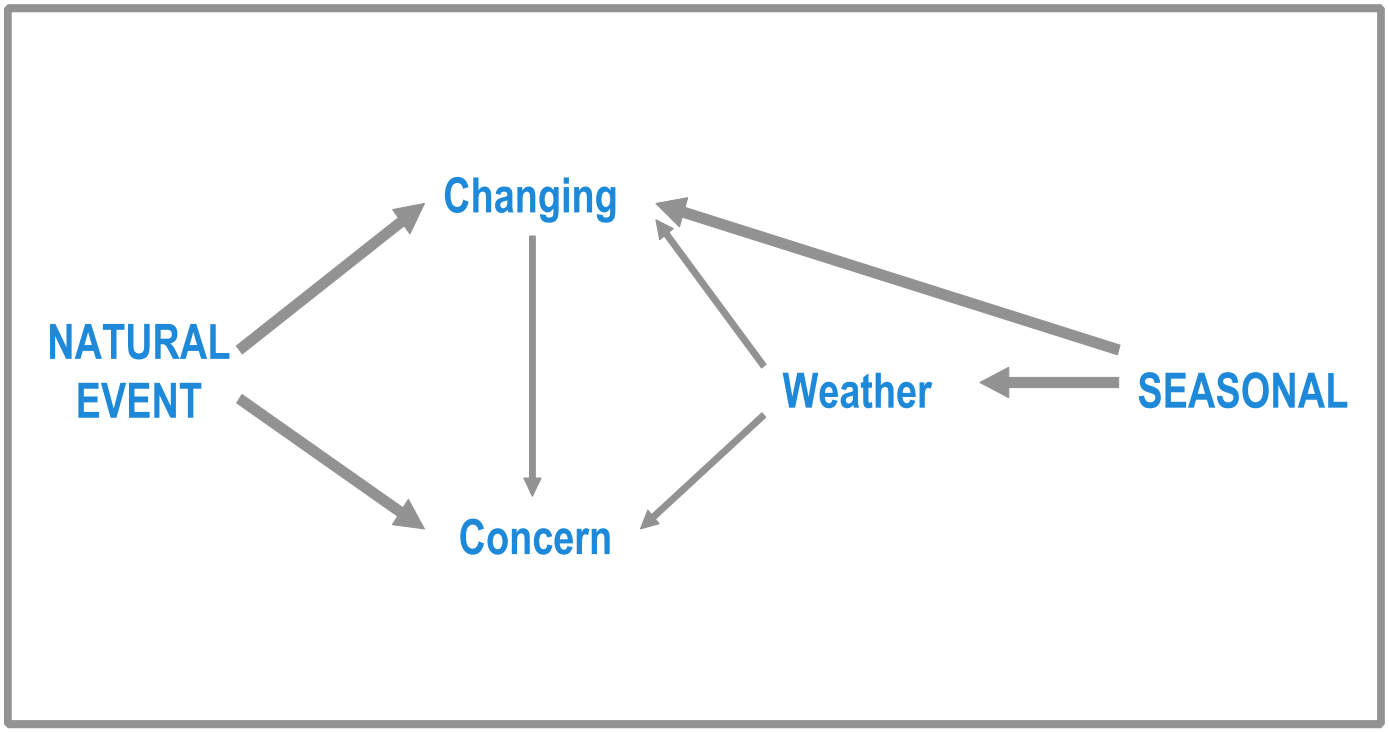
Cognitive structure for ‘Climate Change’

- Regardless of the schema involved, for these people ‘climate change’ is linked in memory with concern, fear, and need to do something about it

Cognitive structure for ‘Climate Change’

- In communication, climate change should be discussed at the secondary level, not in terms of the ‘problem’ because there is no interrelationship among the perceived problems

Cognitive structure for ‘Climate Change’ as benign



Cognitive structure for ‘Climate Change’

- While there is some suggestion of low-level concern among a few, basically for these people climate change simply means changing seasons

Emotion

- Modern neuroscience tells us that humans use emotion to help guide their rational decisions and behavior

The Amygdala: Where it Happens

- The idea of a separate brain system for emotions was perhaps first suggested by James Papez in 1937

- The importance of the amygdala to emotions was identified in 1939 by Klöva and Bucy

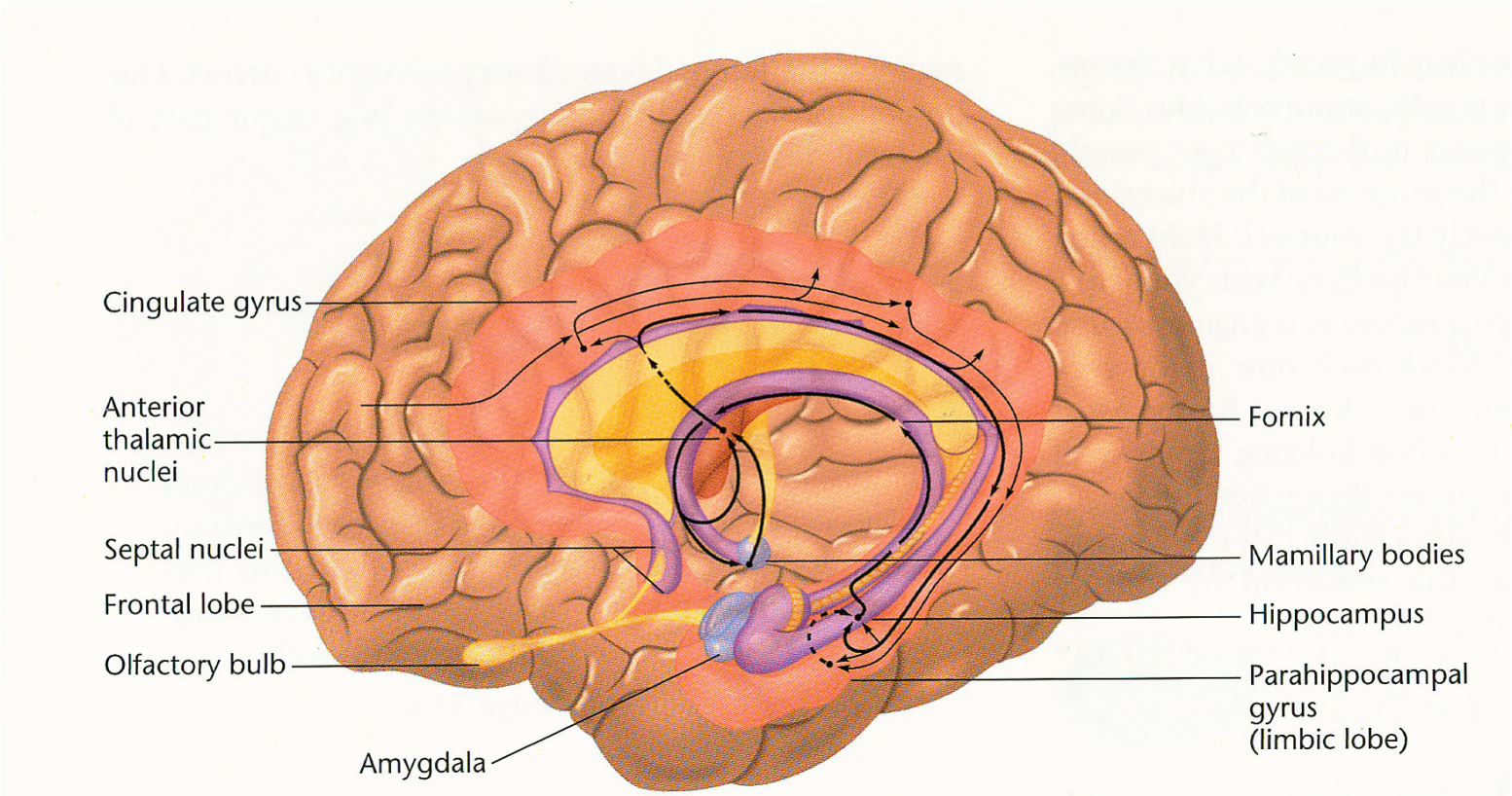
The Amygdala: Where it Happens

- The amygdala plays a central role in the basic emotional system, and
- Neuroscience research increasingly shows the amygdala-centered neural system of emotion interacts extensively with those underlying cognitive processes

The right and left ventromedial parts of the prefrontal cortex are essential for the integration of emotions into decision making

Bechara et al., 2000

Limbic System



The Amygdala: Where it Happens

- Emotion, via the amygdala, influences cognition by mediating the long-term retention and awareness of emotional events, as well as

- Immediate stimulus processing by modulating attention and perception

The Amygdala: Where it Happens

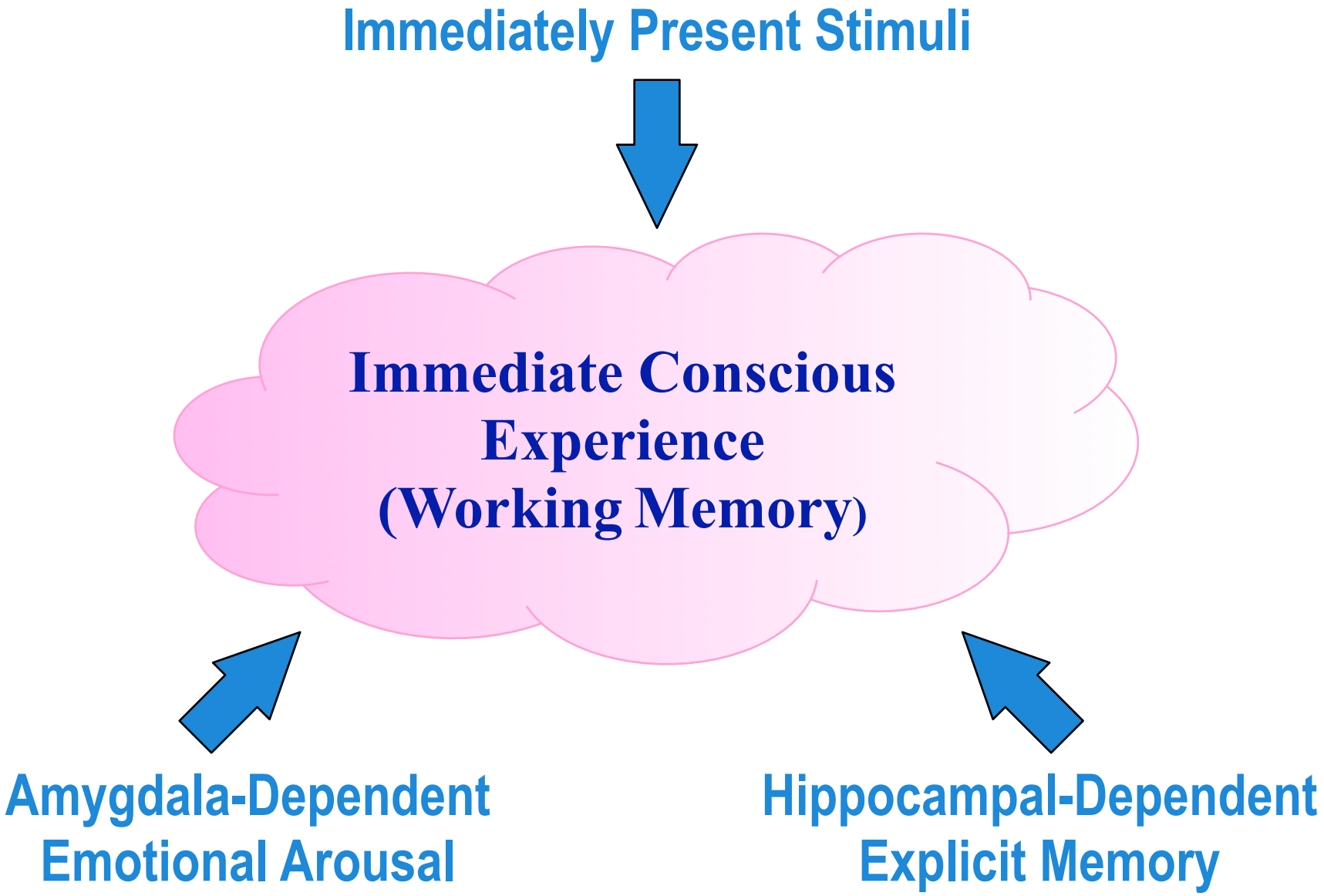
- Amygdala influence on attention and perception suggests that relative to neutral stimuli, processing emotional stimuli will be enhanced

- This should lead to greater memory encoding, resulting in both greater immediate and later awareness

Accessing Correct Emotional Memories

- The amygdala is at the heart of a specific memory system that mediates the learning and expression of emotional response to stimuli of learned significance

- This can occur even in the absence of conscious memory for the events associated with the learning experience


Immediately Present Stimuli
Immediate Conscious Experience (Working Memory)
Amygdala-Dependent Emotional Arousal
Hippocampal-Dependent Explicit Memory

Emotion

- Stronger emotional associations are more likely to be verbalized
- Given the high arousal levels in the media, the paucity of emotional involvement with ‘environment’ and ‘climate change’ is surprising

Emotion

- When discussing specific ‘concerns’ about the environment and climate change, only 9 of 34 people included an emotional association

Emotion

- When specifically asked for emotional associations with the environment and climate change, half did not provide one

Emotion

- Among those who did, most were negative
  - environment: fear, sadness, some anger
  - climate change: mild anxiety, some sadness

Emotion

- These are primary emotions, not secondary or social emotions, suggesting that at least these people may be aroused
- But because it followed specific probing, it is unlikely to be energizing

Some implications for communication

- The paucity of emotional responses and the descriptive nature of most of the discussion suggests that while topical, the subject has not been given much real consideration

- There is a need and opportunity for education

Some implications for communication

- Messages must be very carefully framed, defining explicitly what is meant, and
- Messages should be positioned against secondary levels of cognition, linking them to an appropriate, clearly defined anchor

Some implications for communication

- This will be a challenge
- But, the lack of consistent, focused memories or established cognitive structure provides an opportunity to build appropriate associations in memory

Key: Identify the appropriate links